PRESIDENT DENNIS CONNOR: A few years ago we met here in British Columbia and I have always thought there would be no way to top that meeting. But Bruce Macdonald has been working his very best to make it even better for us. I have always been amazed at the friendliness of the British Columbia people and how well everyone here cooperates to make us feel so welcome. Now, we are ready to start our first session of speakers:

EFFECT OF 10-HOUR PHOTOPERIOD ON *IN VITRO* ROOTING OF A DIFFICULT-TO-ROOT CROP—*PISUM SATIVUM*

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The rooting of pea cuttings has been the subject of intensive physiological research to determine the factors associated with successful rooting (1, 2). Rooting has also been a problem with tissue culture propagation of peas. Filippone (3) reported up to 82% *in vitro* rooting of peas derived from explanted shoot tips of 7-day-old seedlings. The successful medium consisted of the following constituents: Linsmaier Skoog (4) half-strength, 10% sucrose, 2 g/liter activated charcoal, and 220 mg/liter $CaCl_2$. Both activated charcoal and $CaCl_2$ were required for a high rooting percentage.

Research in our laboratory determined planting out of *in vitro* peas directly from multiplication medium was not practical because of nearly 100% mortality. Therefore, *in vitro* rooting was essential for a complete vegetative propagation system. *In vitro* rooting experiments were nonresponsive when testing varying rates of auxins, ancymidol, inorganic salts, and activated charcoal. Placing the cultures in darkness had no positive effect on rooting either. The base line of about 10% of the cultures rooting in 3 to 4 weeks remained constant with all treatments.

Our experiments verified Filippone's that the addition of Ca ion

improved the color and vigor of the shoots. We used $CaSO_4$ rather than $CACl_2$ to supply the additional calcium ions to both multiplication and rooting media. However, addition of both $CaSO_4$ and activated charcoal to the rooting medium had no effect on rooting in our pea cultures.

Additional information became available to us through several experiments. We had no problem in rooting cultures from excised pea embryos and from cultures recently explanted from young seedlings. This made us aware that juvenility was, indeed, an important factor in rooting our established pea cultures. These cultures had been explanted from 4 to 5 week-old seedlings and had been continuously cultured for over a year. In addition, these cultures had started flowering after several recultures. We were able to reduce the flowering problem by excising shoot tips and increasing the frequency of reculturing to 3-week intervals. Our standard culture room conditions were set at a 16 hours light, 8 hours dark per day. The light source was from cool white fluorescent bulbs providing a light intensity of 20 μmol/m^2/s. The culture room temperature was maintained at a constant 20°C.

An experiment was set up with a photoperiod with 10-hours light and 14-hours dark and was compared to the standard 16-hours light and 8-hours dark. The stock cultures were preconditioned for each photoperiod by increasing them for 2 recultures in their respective photoperiod environments before the rooting experiment was initiated. The rooting medium consisted of ⅓ strength Linsmaier-Skoog (4), 30% sucrose, 90 mg/liter $CaSO_4$, 2.5 mg/liter IBA, and 0.8 mg/liter NAA. The pH was adjusted to 5.7 before addition of 8 g/liter Bactoagar. The 10-hour photoperiod treatment resulted in a rooting of 80% compared to 10% in the 16-hour photoperiod.

Not only did the shorter photoperiod become essential for rooting peas, it resulted in 37% less energy requirement for lighting and also reduced energy costs for air conditioning. Some crops respond favorably to the 10-hour photoperiod for both shoot multiplication and rooting. A general growth response of cultures was longer shoots.

LITERATURE CITED

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